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ABSTRACT

The Rural Appalachian Infant Temperament Project followed a group of 80 low-income rural Appalachian children from birth to kindergarten, focusing on two areas of child development: social/emotional functioning and cognitive skills. Subjects were recruited at a Lincoln County, West Virginia, clinic; all were white; and 73 percent had family incomes of less than $10,000. However, this group did not have high rates of other risk factors often associated with poverty. Child temperament, mother-child interaction, and variables in the contextual or caregiving environment were related to children's attachment relationships, behavior problems, language skills, and functioning in kindergarten. For the group, the most significant problematic outcome was language development: 1 month before kindergarten entry, the developmental level of the group's language skills was 1 year below actual age. This paper concludes that a child's development tends to be a function of how many risk and protective factors exist for the child and family over time, rather than the presence of any one predictor. Nevertheless, some measures did appear repeatedly as significant predictors of outcomes; these included mother's social support and marital stability, family's ability to function without welfare, presence of books in the home, various indicators of mother's sensitivity to child's needs and interests, child's reactivity as a newborn, and child's social behavior and coping skills. (Contains 16 references.) (Author/SV)

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- Rural poverty affects early learning and social development
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- Mothers' sensitivity, other protective factors offset some problems

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Early Development of Low-Income Rural Appalachian Children

Margaret Fish, Ph.D., Ellen Jacquet and Hadassah Frye

Abstract

This monograph summarizes results of longitudinal study of the social/emotional and cognitive development of a group of low-socioeconomic-status rural Appalachian children. Child temperament, mother-child interaction, and contextual or caregiving environment variables are related to children's attachment relationships, behavior problems, language skills, and functioning in kindergarten. It is concluded that evaluation of both risks and protective factors is necessary to predict development for individual children and that, as a group, low-income rural Appalachian children appear to face more problems with language and cognitive development than with social and emotional development.

Introduction

Background Information

Economic disadvantage is widely recognized as a stressor on parenting and child development. Research shows that children in low-socioeconomic-status (SES) families are more likely than others to experience less optimal development. For example, higher rates of insecure child-caregiver attachment (Spieker & Booth, 1988), more behavior problems (Campbell, Breaux, Ewing, & Szumowski, 1986), and lower language skills, reading ability, and school achievement (Walker, Greenwood, Hart, & Carta, 1994) have all been found for children in low-SES families.

Past research on child development in populations seen as high risk based on poverty or low SES has often focused on urban populations. However, data from the Children's Defense Fund shows that all ten states with the highest rates of child poverty are rural and that 23% of rural children are poor. In fact, despite the common stereotype of the poor child as urban, African American, and living in a single parent family, the majority of low-income children are white and living in rural areas in two-parent families.

Many rural Appalachian children experience economic disadvantage. For example, in West Virginia, the only state entirely within the Appalachian region, 1995 Census Bureau figures show a child poverty rate of 30%, higher than 47 other states. In addition, more West Virginia children were living with parents who did not have full-time, year-round employment than in any other state.

Despite the increased risk posed by widespread economic disadvantage, longitudinal study of the social and cognitive development of rural Appalachian children had not previously been done. There was a need for reliable information, because longitudinal study of development in context increases understanding of the processes leading to differences in development within low-SES populations and, importantly, to identifying risk and protective factors.

The Research Project

The Rural Appalachian Infant Temperament Project (RAITP) was begun in 1992 with funding from the Maternal and Child Health Research Bureau[1] and has followed a group of low-income rural Appalachian children from birth through kindergarten. In this research project, carried out through the cooperation of Lincoln Primary Care Center in Hamlin, West Virginia, we have followed children's development in two areas: social/emotional functioning and cognitive skills.

Participants in the study were recruited from women obtaining prenatal care at Lincoln Primary Care; 69% of the women approached agreed to participate. Of 113 women recruited whose infants met study criteria (singleton birth, normal neonate), 98 completed the infancy phase and 80 completed the entire study through kindergarten. Mothers were paid for participation ($30 to $40 per visit). Reflecting the demographics of Lincoln County, all parents were white.

Data on the study participants confirms low socioeconomic status. When the study began, 73.5% of mothers reported annual family income less than $10,000, and 68.4% received public assistance (either food stamps or Aid to Families with Dependent Children, or both). About half of the parents (53% of the mothers and 52% of the fathers) were high school

graduates; 24.4% of parents had a ninth grade education or less. Four years later, 52.4% of mothers still reported annual family income below $10,000 and 61.9% received public assistance.

However, despite low SES, this rural Appalachian group did ***not*** have high rates of other risk factors often associated with economic disadvantage. There were few teenaged mothers; only 12.2% were 18 or under. There were not disproportionate numbers of single mothers or unstable relationships. When interviewed prenatally, 77.6% of women were married or living with a partner; the figure at 4 years was 86.9%. Further, 67.9% remained with the same spouse or partner from the prenatal period through 4 years. Finally, social support was widely available from the extended family. More than 90% of mothers reported having multiple family members living nearby whom they visited once a week or more. Thus, it appears that many low-income rural Appalachian families have social support strengths which may be less common in other economically disadvantaged groups.

Methods

In this study, we collected information about children and their families across the period from birth through kindergarten. We began with a prenatal interview with mothers and then saw children with their mothers at 2 weeks, 4 months, 9 months, 15 months, 4 years, and prior to kindergarten. Finally, we asked kindergarten teachers to complete a questionnaire evaluating children's classroom behavior and progress. Thus, we followed development through infancy and the preschool period in the family, and then assessed children at the end of the study when they had completed their first year of school.

The choice of measures or areas to gather information about reflected our belief that individual differences in the caregiving environment which children experience, in children's temperament, and in the relationships children have with caregivers all influence development. Our outcome measures across the study focused on two areas: social/emotional development and language development.

Indicators of individual differences in **the caregiving environment** included *demographic variables* (e.g., parents' ages and years of education, mother's marital status, number of children, work status, family income, and receipt of public assistance) and well-validated measures[2] of *mother personality*, *social support*, and *relationship satisfaction*.

To study **temperamental differences in children** (Fish, 1998), we tested them as newborns for their *reactivity* to mildly startling events (having a pacifier taken away and feeling something very cold) and we used videotaped toy play sessions with mother to rate children's *negative affect* (fussing, crying, and anger) and *positive/social behavior* (smiling, laughing, and paying attention to other people) at 4, 9, and 15 months and at 4 years. We also had mothers complete temperament questionnaires about their baby's behavior at 4 and 9 months.

To measure **mother-child interaction**, we used the videotaped play sessions to rate how mothers related to their children on dimensions such as *sensitivity* (being tuned in to and reacting appropriately to the child's interests and feelings), *over-controlling/ intrusive behavior* (bossy or poorly timed behavior that ignores what the child wants), *facilitating the child's learning* (skillfully helping the child to succeed), and *negative control* (negative feedback without suggestions for improvement, or harsh, belittling comments) at 4 and 9 months and 4 years.

We also assessed **mothers' attitudes** about caring for children. At 4 months, we had them complete questionnaires on how comfortable and competent they felt as a parent *(maternal self-efficacy)* and how quickly they would *respond to a crying infant*. At 4 years, they answered questionnaires on *childrearing values* and *attitudes toward spanking*.

Outcome measures in the area of social/emotional development included *attachment* to the primary caregiver (in infancy and preschool) and preschool *behavior problems*. Attachment relationships were evaluated as secure (more optimal) or insecure (less optimal) by independent trained coders from standardized videotaped interactions. Behavior problem scores were obtained from mothers' responses to the most widely used standardized questionnaire measure.

We assessed **cognitive outcomes**—children's *language and communications skills*—with standardized age-appropriate measures at 15 months, 4 years, and immediately before entering kindergarten. The **kindergarten teacher's evaluation** covered both social/emotional and cognitive outcomes. It included ratings of the child's *ability to attend and work independently*, of his/her *creativity, interest, and verbal skills*, of *how well he/she got along with others*, and of *how sociable* the child was. The teacher also made a global categorization of the child as *making or not making satisfactory progress in kindergarten*.

Results

Comparison to Middle-Class Mothers

The context of child development—characteristics of families and their situations—is important to consider, especially when studying low-income children. In particular, we were interested in differences and similarities between low-income rural Appalachian families and middle-class families who are not at risk due to low SES. Therefore, we compared some of our findings to results from a study of middle-class mothers and children in a university community in Pennsylvania (Fish & Stifter, 1999). The comparisons included contextual factors that we believe affect parenting as well as actual parenting feelings and behavior.

Demographic comparisons of the rural Appalachian and the Pennsylvania mothers showed highly significant differences in education level, with the West Virginia mothers having, on average, 4 years less education. The rural Appalachian women were also younger, but more likely to have other children. The Pennsylvania mothers were somewhat more likely to be married or living with a partner and much more likely to be employed outside the home (54% versus 24.5%).

West Virginia mothers also differed from the middle-class mothers in some other ways that are consistent with lower socioeconomic status. Specifically, the Appalachian mothers were more likely to smoke and much less likely to breast feed their infant.

Differences which emerged in the personality/emotional outlook and relationship variables we measured all reflected more negative views on the part of the rural Appalachian women. In comparison to the middle-class women, they reported lower positive feelings and more anxiety, depression, and hostility; they also rated conflict and ambivalence about their partner relationship higher. Many other studies have reported an association between low SES and maternal depression (Parker, Greer, & Zuckerman, 1988).

Importantly, in spite of these differences consistent with SES risk, the West Virginia mothers did <u>not</u> compare unfavorably on measures of maternal attitudes and behavior. Rural Appalachian women indicated that they felt as competent on the maternal self-efficacy measure as the middle-class mothers did. The West Virginia mothers also compared favorably to middle-class mothers in how they interacted with their infants. They were rated as more sensitive and less over-controlling/intrusive with younger infants (4-5 months) and as having behavior similar to middle-class mothers with older infants (9-10 months).

Attachment Relationships

The first developmental outcome we assessed was attachment of the child to the primary caregiver (Fish, 2001). This early social/emotional relationship is considered to be an important influence on children's development. Attachment relationships are also believed to influence later relationships with friends, partners, and one's own children.

Our results at 15 months showed that 50.5% of the infants were classified as securely attached. Among the insecure infants, 29.5% were classified insecure/disorganized, which has been described as the most insecure pattern of attachment. Finding more than 40% of infants with insecure attachment, including a relatively high number of disorganized infants, is similar to results from other high-risk groups.

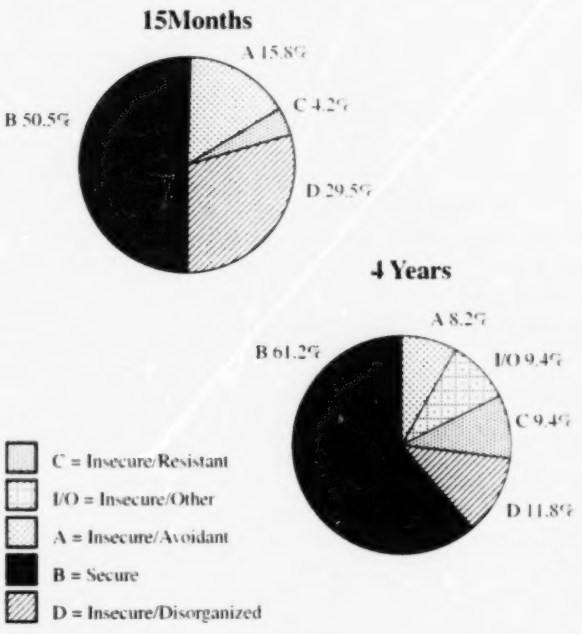
Insecure attachment in rural Appalachian infants was found to relate to the total number of "risk" conditions present across the three categories of mother behavior, caregiving environment factors, and child characteristics. Risk factors which influenced attachment relationships included the mother behaviors of decreasing interactional sensitivity and increasing intrusiveness between 4 and 9 months, as well as low responsiveness to infant crying. Contextual or caregiving environment variables also affected attachment classification—specifically, mother having low social support, receiving public assistance, not

completing high school, having more negative personality traits and experiencing changes in partner/relationship status and other disruptive events. Finally things about infants themselves were important. Infants who were male, who were low in positive/social behavior, and who failed to use mother as a "secure base" in a situation of uncertainty were more at risk for insecure attachment.

It is important to note that these factors may be viewed either as risks for insecure attachment or as protective factors for secure attachment, depending upon their level. For example, low social support in mothers and low positive/social behavior in babies are risks, but high support from others and more positive/social behavior are protective factors. It appears from our analyses that all of the factors above were influential, but what was most important was the cumulative effect, the total number of risks or protective factors for an infant-mother pair.

At 4 years, a positive change in attachment was observed. As preschoolers, the rural Appalachian children showed about the same distribution of secure and insecure attachment classification as is typically seen in low risk, middle-class samples. At 4 years 61.2% of the children were classified as secure. Over 70% of the children who had been secure at 15 months stayed secure at 4 years. Of the children who had been classified as insecure at 15 months, nearly half of them changed to secure, including the majority of the previously disorganized children. Attachment distributions at each age are shown in **Figure 1**.

Figure 1
Change in Attachment - Infancy to Preschool



Either maintaining or attaining secure attachment over time was associated with some of the same factors we had identified in infancy. Children who changed from insecure as infants to secure attachment at 4 years were more likely to be male, tended to be more reactive as neonates, and were less negative at 9 months. Their mothers had more social support, declined less in sensitivity between 4 and 9 months, were more likely to maintain a stable partner relationship from 15 months to 4 years, and tended to be less likely to receive public assistance at 4 years. Children who stayed secure from infancy to 4 years were also more reactive as newborns. Their mothers were more helpful in facilitating the child's success with a difficult puzzle at 4 years and also tended to be more likely to maintain stable relationship status from 15 months to 4 years and to be employed at 4 years. Thus, several positive factors about children, mothers, and the caregiving environment were associated with either becoming secure or staying secure.

Behavior Problems

Another aspect of social/emotional development we assessed at 4 years was children's behavior problems. Childhood behavior problems are of concern because they affect school and social functioning and may be associated with more serious adjustment problems later in life. In general, behavior problems are more common in children with lower socioeconomic status than those with middle-class status. Like other studies of young low-SES children (Rose, Rose, & Feldman, 1989), we did find average behavior problem scores higher than would be expected in low-risk samples.

In our study, higher mother-reported behavior problems at 4 years were correlated with negative predictors: more negative maternal personality, lower social support, less satisfaction with marital relationships, lower sensitivity interacting with the child, and more endorsement of spanking at 4 years. Mother ratings of fussiness in

infancy and experimenter-rated uncooperative behavior at 4 years were also correlated with behavior problems.

Language Development

As infants, the rural Appalachian children showed early language skills comparable to middle-class infants (Fish & Pinkerman, submitted). Their average number of phrases understood, number of words understood, number of words produced, and total communicative gestures were very similar to what is reported for other 15-month-old children who are not in economically disadvantaged families.

Infants who scored higher on early communication skills were distinguished by more positive mother and temperamental characteristics. For example, mothers of infants with higher communication skills were more likely to have planned the pregnancy, did not smoke while pregnant, were of higher socioeconomic status, had more social support, and gave their infant more contingent feedback. Higher scoring infants were more positive and social at 9 months.

Language skills at 4 years and prior to kindergarten entry were assessed with a standardized measure, the Preschool Language Scale-3. PLS-3 scores have an average (mean) of 100 and a standard deviation of 15. Thus, it would be expected that most children would score between 85 and 115 on these scales. However, a majority of the rural Appalachian children scored below 85 at both ages. (See **Table 1**.)

Table 1
Preschool Language Results

Score	n	mean	range	< 85
4-yr Auditory Comprehension	80	83.54	58-128	60%
4-yr Expressive Language	79	82.01	61-116	67%
4-yr Total Language	79	80.84	59-125	70%
Pre-K Auditory Comprehension	80	84.30	52-109	50%
Pre-K Expressive Language	78	79.64	52-118	67%
Pre-K Total Language	77	80.30	50-111	69%

[1]Sample sizes were 85 at 4 years and 82 at pre-kindergarten, but children for whom no baseline score could be obtained could not be scored.

Low-income rural Appalachian children had group means on auditory comprehension, expressive language, and total language that were below 85. At both 4 years, and prior to kindergarten entry, about 70% of the children did not attain a total language score of 85, i.e. within 1 standard deviation of the mean of 100. There was no change or "catch-up" between age 4 and the time of school entry.

Another way of looking at how these children scored relative to what is typical entering school is to relate their chronological age to the language-equivalent age obtained from the PLS-3. At the assessment approximately 1 month before kindergarten, the children's average real age was 64.5 months. Their average language-equivalent age was 52.1 months. The mean difference between chronological age and language-equivalent age was 12.4 months. Thus, on average, the developmental level of language skills for this group of children was a full year below their actual age when entering school.

We examined these results to see if Head Start or other early education experiences affected children's language scores. Almost all children who had preschool experience attended Head Start. Most families were eligible for Head Start; the most common reason given for children not attending was transportation problems, followed by wanting to keep the child at home with parents. At age four, 33% of the children in the study were attending and by the time they entered kindergarten, 53% had some experience in Head Start or another program.

Children who were attending Head Start or another preschool program at 4 years tended to have higher total language scores (means 83.96 vs. 79.12). In addition, those who attended had significantly higher language critical thinking scores (means 5.68 vs. 4.50). Thus, some positive effect of Head Start/preschool attendance was seen at 4 years.[3]

Within the group of children we studied, some children (28.6% at 4 years and 31.2% pre-kindergarten) did have total language scores above 85. Those children with better language skills were best distinguished from others by several factors. They had more books at home, and they had higher language skills, beginning in infancy. They were also more likely to have been in

secure attachment relationships as infants. Children with better language skills had fewer behavior problems at 4 years and they were more likely to show initiative—seen in trying to solve a difficult puzzle themselves before asking for help. Mothers of children with higher language scores were more facilitative with infants and less over-controlling with 4-year-olds.

Factors Related to Kindergarten Competence

The final outcome in this phase of the study relates variables measured earlier to kindergarten teachers' ratings of children's competencies. Teachers indicated whether the child was making satisfactory progress in kindergarten and completed the 42-item Classroom Behavior Inventory which covers such areas as work habits, interest, grasp of ideas, consideration for others, and positive/social behavior.

Similar to other outcome measures, kindergarten teachers' ratings were related to child, mother, and contextual variables. Children who were more focused and on-task in kindergarten had been more focused and cooperative at 4 years and prior to kindergarten, and they had higher early language scores. In addition, their mothers were low in negative control and the children had more books at home.

Other kindergarten behavior was predicted largely by earlier temperament and abilities of the child. Children who were more creative and showed a good grasp of ideas and verbal ability in kindergarten had paid more attention to toys at 4 months, coped better with frustration at 9 months, and were more compliant and persistent and able to do a puzzle more quickly at 4 years. Their language skills were also higher at 15 months and prior to kindergarten.

Similarly, previous child cooperation/compliance predicted getting along well with others in kindergarten, as did mothers having high social support and being low in negative control.

When we looked at factors that predicted overall kindergarten success, our analyses showed that several factors contributed to distinguishing the children whom teachers said were making satisfactory progress: family factors included higher mother sensitivity, not receiving public assistance, and parent involvement at school; child factors included better coping with frustration in infancy, good preschool language skills, and cooperativeness.

Discussion

In conclusion, our longitudinal study of the early development of low-income rural Appalachian children increases knowledge about how this group compares to other previously studied low-SES groups and also improves understanding of how risk and protective factors operate within the rural Appalachian population to influence development.

Between-Group Differences

Our examination of between-group differences—that is, how rural Appalachian mothers and children compare both to low-risk middle-class and to other high-risk groups—has revealed some predictable as well as some unexpected findings. Not surprisingly, when compared to middle-class mothers with higher incomes and more education, low-SES rural Appalachian women scored higher on negative feelings. However, despite this more negative general outlook, rural Appalachian mothers felt as competent in their roles as mothers as better resourced middle-class women did, and, contrary to what parenting models would predict, they were equal to or exceeded middle-class mothers in ratings of sensitive interaction with their infants.

Although social support was not assessed in the middle-class study, we speculate that the high level of social support which was available to almost all of the rural Appalachian women helped them to cope with fewer resources and more difficult life circumstances. Typically, middle-class families, especially geographically mobile professional couples, live some distance from extended family members, making them relatively unavailable to provide help.

In addition, it seems probable that the relatively high levels of maternal sensitivity demonstrated by the rural Appalachian women served to diminish the impact of the low-SES environment, especially on children's social/emotional development. The finding that low-SES mothers who have low social support are more over-controlling and more adult centered (less sensitive) while interacting with children than middle-class mothers (Booth, Rose-Krasnor, & Rubin, 1991) reinforces our assumption that high social support is a

protective factor in the rural Appalachian population and promotes mothers' positive interaction with their children.

With regard to child development, we did not make direct comparisons with other groups of children, but can relate our findings to those previously reported in the research literature. Overall, our results are similar to what has been found for other low-SES children. For example, we found that the children we studied did show fewer secure attachment relationships and more insecure relationships in infancy than low-risk samples, although that tendency was somewhat reversed by the time children reached the preschool period. Others studying low-SES or disadvantaged children have reported similar results (Egeland & Farber, 1984 and Waters & Valenzuela, 1999). The average number of behavior problems at 4 years was similar to other low-SES children and higher than normative samples (Rose et al., 1989). Finally, in keeping with other studies that have related low SES to preschool language skills (Hart & Risley, 1995), a majority of the rural Appalachian children had significantly low scores entering kindergarten, although language problems had not been evident in infancy. (It has been suggested that emerging infant language is primarily influenced by heredity and that environmental influences are not seen until sometime after 15 months [Arriaga, Fenson, Cronan, and Pethick, 1998]).

If we consider the percentages of children with each problematic outcome (insecure attachment, elevated behavior problems, and low language skills), it appears that cognitive development, as measured by standardized "school" language skills, is a larger concern for rural Appalachian children's future than is social/emotional development. Not only did more children demonstrate language problems, but language abilities are key to success with reading and for school achievement.

This concern with cognitive development assumes even further importance because rural Appalachian parents value school achievement. At the same time that many of the children entered school with low language ability, over 90% of their parents told us that they wanted their child to go to college. We view this discrepancy between children's entry skills and the educational outcome desired by parents as posing an enormous challenge for schools in rural Appalachia.

Individual Differences Among Rural Appalachian Children

The primary emphasis of this investigation has been on individual differences—what distinguishes one child from another within the rural Appalachian group and why some children may have more optimal development than others. Our results pertaining to individual differences are important because the patterns suggest some inter-related variables which can function either as risk factors or as protective factors in low-income families.

First, we found that it was necessary to look at several areas of influence. Across outcomes, measures of the caregiving environment, of mothers' interactional styles, and of children's characteristics, considered together, predicted developmental differences. Further, we concluded that a child's development tends to be more a function of how many risk and protective factors exist for children and families over time, rather than the presence of any one predictor.

However, it is also true that some measures did appear repeatedly as significant predictors of outcomes. In the area of caregiving environment variables, social support available to mothers, stability in partner relationships, the ability of the family to manage without public assistance, and the number of books the child had were important. We have already discussed the likely importance of social support in helping to buffer adversity and enable mothers to interact more sensitively with their children. A stable partner relationship presumably plays a similar role. Managing without public assistance is an indication of better family function and more economic resources. If the child has more books, we assume that parents recognize the importance of early language skills and also read and talk to their child more.

Various indicators of mothers' sensitivity to the child's needs, interests, and abilities predicted both social/emotional and cognitive development. There is an abundance of research supporting the view that how parents interact with and teach their children influences their social and cognitive development, with more sensitive, child-centered, facilitative parenting leading to more optimal child outcomes.

Finally, greater reactivity in the child as a newborn and more positive/social temperament, verbal ability, and

capacity to deal with challenging situations in infancy and early childhood distinguished better-functioning children in both social/emotional and language development. It is likely that more reactivity to mildly perturbing stimuli reflects a more physiologically competent neonate; it is adaptive for a newborn to react to something startling, to let the caregiver know that something has made him/her uncomfortable. Positive/social behavior signals that the infant is positively engaged with others, which leads to learning and attachment. Individual differences in language skills appear to be important predictors of future development, even in infancy, as does the ability to cope well with challenge.

We suggest that the task of those who provide support services, health care, and educational programs to low-income rural Appalachian children is, first, to identify strengths and risk factors within families and, second, to target efforts in order to most effectively build on strengths and reduce risk factors. Clearly, in attempts to facilitate optimal development for children, some factors are more easily influenced by interventions than others. Increasing access to early prenatal care and regular well-baby care will affect neonatal and preschool functioning positively and may provide opportunities to address parents' social support needs. Making children's books available and encouraging parents to read and talk more to their young children is important, as is dealing with adult literacy problems. Helping families to attain independence from public assistance through adult education and job training appears to have broad benefits for children's development.

Finally, based on the results of this research project, we see a strong need for schools to target language skills and for programs providing services to families to promote awareness in parents of how to positively affect their children's social and cognitive development. Early interventions appear particularly important in view of our findings that 15-month language skills and attachment are significant predictors of later development.

Endnotes

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[2]Specific detail on measures and their reliability and validity can be found in the references listed at the end of this publication. All questionnaire data were collected in an interview format, with the researcher reading the questions, clarifying them if needed, and recording the answers. This procedure was used because talking to others is a more comfortable and familiar part of rural Appalachian experience than filling out questionnaires and because some mothers had low reading levels.

[3]One might question why Head Start or preschool experience didn't make more difference in children's language scores. The modest positive effects seen at 4 years were not found in the pre-kindergarten language scores. However, it is important to remember that Head Start was designed as a comprehensive two-generation program with very broad developmental goals; only one of the program's seven stated goals relates directly to intellectual performance (Zigler and Styfco, 1993).

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